



Polytetrafluoroethylene (PTFE) - Material Information

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General Description:

Common Brand names :Fluon Hostaflon TF Teflon TFE

General Description : A totally fluorinated polymer that is very frequently called Teflon®. This can cause confusion as DuPont also use this brand name for a family of related fluoropolymers. It is semi-crystalline, semi-opaque and white. It has outstanding chemical resistance being unaffected by almost all chemicals and also has a very high oxygen index (i.e. is inherently non-flam). It has a very low coefficient of friction and is stable to high temperatures. It is soft, easily deformed, very prone to creep and low in strength with poor radiation resistance. It is expensive and cannot be melt-processed (although in theory it melts at 327C, its melt viscosity is virtually infinite) and so is formed by powder sintering methods.

Industrial applications include bearings, seals, O-rings, high temperature electrical insulation, non-stick coatings and linings for vessels etc, etc. Its unusual properties make it invaluable for a wide range of laboratory applications.

Chemical Resistance

| | |
|--------------------------|------|
| Acids - concentrated | Good |
| Acids - dilute | Good |
| Alcohols | Good |
| Alkalis | Good |
| Aromatic hydrocarbons | Good |
| Greases and Oils | Good |
| Halogenated Hydrocarbons | Good |
| Halogens | Good |
| Ketones | Good |

Electrical Properties

| | |
|---|------------------------------------|
| Dielectric constant @1MHz | 2.0-2.1 |
| Dielectric strength (kV mm ⁻¹) | 50-170 |
| Dissipation factor @ 1MHz | 0.0003 - 0.0007 |
| Surface resistivity (Ohm/sq) | 10 ¹⁷ |
| Volume resistivity (Ohmcm) | 10 ¹⁸ -10 ¹⁹ |

Mechanical Properties



| | |
|--|----------------|
| Coefficient of friction | 0.05-0.2 |
| Elongation at break (%) | 400 |
| Hardness - Rockwell | D50-55 - Shore |
| Izod impact strength (J m ⁻¹) | 160 |
| Poisson's ratio | 0.46 |
| Tensile modulus (GPa) | 0.3-0.8 |
| Tensile strength (MPa) | 10-40 |

Physical Properties

| | |
|--|-----------|
| Density (g cm ⁻³) | 2.2 |
| Flammability | V0 |
| Limiting oxygen index (%) | 95 |
| Radiation resistance | Poor |
| Refractive index | 1.38 |
| Resistance to Ultra-violet | Excellent |
| Water absorption - over 24 hours (%) | 0.01 |

Thermal Properties

| | |
|--|---------|
| Coefficient of thermal expansion (x10 ⁻⁶ K ⁻¹) | 100-160 |
| Heat-deflection temperature - 0.45MPa (C) | 120 |
| Heat-deflection temperature - 1.8MPa (C) | 54 |
| Lower working temperature (C) | -260 |
| Specific heat (J K ⁻¹ kg ⁻¹) | 1000 |
| Thermal conductivity @23C (W m ⁻¹ K ⁻¹) | 0.25 |
| Upper working temperature (C) | 180-260 |

Properties for Polytetrafluoroethylene Film

| Property | | Value |
|-------------------------------------|---|---------|
| Dielectric Strength @25µm thick | kV mm ⁻¹ | 160 |
| Dissipation Factor @1MHz | | <0.0001 |
| Elongation at Break | % | 100-400 |
| Permeability to Carbon Dioxide @25C | x10 ⁻¹³ cm ³ . cm cm ⁻² s ⁻¹ Pa ⁻¹ | 7 |
| Permeability to Hydrogen @25C | x10 ⁻¹³ cm ³ . cm cm ⁻² s ⁻¹ Pa ⁻¹ | 7 |
| Permeability to Nitrogen @25C | x10 ⁻¹³ cm ³ . cm cm ⁻² s ⁻¹ Pa ⁻¹ | 1 |
| Permeability to Oxygen @25C | x10 ⁻¹³ cm ³ . cm cm ⁻² s ⁻¹ Pa ⁻¹ | 3 |
| Permeability to Water @25C | x10 ⁻¹³ cm ³ . cm cm ⁻² s ⁻¹ Pa ⁻¹ | 25? |

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